UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/051,886	01/16/2002	Valery V. Felmetsger	SPUTT-57354	7950

7590 04/20/2004

ELLSWORTH R. ROSTON, ESQ.
FULWIDER PATTON LEE & UTECHT, LLP
Howard Hughes Center
6060 Center Drive, Tenth Floor
Los Angeles, CA 90045

EXAMINER	
CHAMBLISS, ALONZO	
ART UNIT	**PAPER NUMBER**
2827	

DATE MAILED: 04/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/051,886	FELMETSGER, VALERY V.	
	Examiner	Art Unit	
	Alonzo Chambliss	2827	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 January 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-69* is/are pending in the application.

4a) Of the above claim(s) *2* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3, 5, 8-13, 17-19, 22, 24-33, 35-59, 65, and 66* is/are rejected.

7)☒ Claim(s) *4,6,7,14-16,20,21,23,34,60-64 and 67* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Amendment B filed on 1/23/04 has been fully considered and made of record in Paper No. 9.

Response to Arguments

2. Applicant's arguments filed 1/23/04 have been fully considered but they are not persuasive.

Applicant alleges that Akiyama does not disclose microscopic roughness on the surface of the wafer that is created by providing ions of an inert gas (i.e. argon) on the surface of the wafer with an insufficient energy to etch the surface of the wafer but with a sufficient energy to create the microscopic roughness on the surface of the wafer. This is deemed unpersuasive because Akiyama disclose microscopic roughness on the surface of the wafer that is created by providing ions of an inert gas (i.e. argon) on the surface of the wafer with an insufficient energy to etch the surface of the wafer (i.e. removing the oxide layer from the surface of the wafer) but with a sufficient energy to create the microscopic roughness on the surface of the wafer (see col. 2 lines 20-42 and 62-67, col. 7 lines 45-62, and col. 12 lines 1-9; Figs. 4A and 4B). Furthermore, nowhere in the MPEP does it state that a reference has to specifically state word for word the claimed limitation.

In regards to the Admitted Prior Art failing to teach a chromium layer with a low intrinsic tensile stress on the surface of the chromium layer with a layer of nickel vanadium with an intrinsic on the surface of the chromium layer to neutralize the low

intrinsic tensile stress produced by the chromium layer. This deemed to be unpersuasive because the Admitted Prior Art disclose a chromium layer with a low intrinsic tensile stress on the surface of the chromium layer with a layer of nickel vanadium with an intrinsic on the surface of the chromium layer to neutralize (i.e. covering the chromium layer from the next deposited material) the low intrinsic tensile stress produced by the chromium layer (see specification, pages 1, 2, page 7 lines 5-14, and page 8 lines 6-10). The chromium layer has a low intrinsic tensile stress since the composition of the material has a tensile load. Also, since applicant has not recited in the claim how the chromium layer is neutralize the examiner views neutralizing as covering the chromium layer.

In regards to Honig failing to disclose a metal layer deposited on the surface of a wafer in a magnetron with no RF bias or with a low RF in the magnetron and with a low flow rate of molecules of an inert gas. First, since applicant has not specified in the claim what the low RF and low flow rate are the examiner views Honig as discloses a LOW RF and low flow rate since a RF is presence and molecules in the inert gas are moving. Second, Honing discloses a metal layer deposited on the surface of a wafer in a magnetron with no RF bias or with a RF in a magnetron (see col. 1 lines 35-55 and col. 2 lines 12-30). Therefore, this action is made **final**.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-69 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: " a wafer disposed on a wafer land and a lens shield that is spaced from to the wafer land " since the lower powering step must include the combination of a wafer land and the lens shield in order to create argon ions forming microscopic roughness on the surface of the wafer.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-3 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Akiyama et al. (U.S. 6,391,796).

With respect to Claim1, Akiyama teaches removing a thin layer (i.e. oxide film) from the surface of a wafer to eliminate any impurities from the surface of the wafer and thereafter creating microscopic roughness on the surface of the wafer to receive a deposition of the material on the surface (see col. 2 lines 20-42 and col. 12 lines 1-9; Figs. 4A and 4B). Akiyama teaches microscopic roughness on the surface of the wafer is created by providing ions of an inert gas (i.e. argon) on the surface of the wafer with

an insufficient energy to etch the surface of the wafer but with a sufficient energy to create the microscopic roughness on the surface of the wafer (see col. 2 lines 29-42 and col. 3 lines 14-27). Sufficient energy to create the microscopic roughness is present, since a gas environment with argon introduced to the surface of the wafer will generate some level of microscopic roughness.

7. Claim 5 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by the Admitted Prior Art.

With respect to Claims 5, the Admitted Prior Art teaches removing (i.e. etching) a thin layer from the surface of the wafer, thereafter depositing a chromium layer with a low intrinsic tensile stress on the cleaned surface of the wafer, and thereafter depositing a layer of nickel vanadium with an intrinsic stress on the surface of the chromium layer to neutralize (i.e. covering the chromium layer from the next deposited material) the low intrinsic tensile stress produced by the chromium layer (see specification, pages 1, 2 in its entirety, page 7 lines 5-14, and page 8 lines 6-10). The chromium layer has low intrinsic tensile stress since the material has a tensile load.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 9-12, 22, 23, 29, 31, 39, 41, 42, 44-58, 66, 68, and 69, insofar as definite are rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama et al. (U.S. 6,391,796) as applied to claim 5 above, and further in view of the Admitted Prior Art.

With respect to Claims 9-12, 22, 29, 31, 39, 41, 44-47, are 48-55, Akiyama discloses removing a thin layer (i.e. oxide film) from the surface of a wafer to eliminate any impurities from the surface of the wafer and thereafter creating microscopic roughness on the surface of the wafer to receive a deposition of the material on the surface by inert gas (i.e. argon gas)(see col. 2 lines 20-42 and col. 12 lines 1-9; Figs. 4A and 4B). Akiyama fails to disclose wherein the chromium is deposited in a layer on the microscopically rough surface of the wafer to produce an intrinsic tensile stress with a low stress value in the chromium layer and wherein the nickel vanadium layer is deposited on the surface of the chromium layer to produce a low intrinsic compressive stress with a value to neutralize the low intrinsic tensile stress in the chromium layer. However, Admitted Prior discloses wherein the chromium is deposited in a layer on an etch surface of the wafer to produce an intrinsic tensile stress with a low stress value (i.e. a rate sufficient to deposit the metal layer) in the chromium layer and wherein the nickel vanadium layer is deposited on the surface of the chromium layer to produce a low intrinsic compressive stress with a value to neutralize (i.e. covering the chromium layer from the next deposited material) the low intrinsic tensile stress in the chromium layer (see specification, pages 1, 2 in its entirety, page 7 lines 5-14, and page 8 lines 6-10). The chromium and nickel vanadium layers have low intrinsic tensile stress since the materials has a tensile load. Akiyama and the Admitted Prior Art have substantially

the same environment of a wafer that has been etched to clean the wafer surface. Therefore, it would have been obvious to incorporate the deposition of the chromium and nickel vanadium layer on the surface of the wafer taught by Akiyama, since the deposition of material would allow the wafer to be bonded to a sub-assembly as taught by the Admitted Prior Art. Furthermore, one skilled in the art is atomically bonding a chromium layer to the microscopically rough surface on the wafer, since atomically bonding with the microscopic would prove stable connection between the chromium layer and the wafer.

With respect to Claims 23 and 56-58, the Admitted Prior Art discloses wherein a layer of a metal selected from a group consisting of gold, nickel and copper is deposited on the surface of the nickel vanadium layer and wherein a component or sub-assembly is soldered to the layer of the metal selected from the group consisting of copper, gold and silver (see specification, pages 1, 2 in its entirety, page 7 lines 5-14, and page 8 lines 6-10).

With respect to Claims 66, 68, and 69, Akiyama discloses microscopic roughness on the surface of the wafer is created by providing ions of an inert gas (i.e. argon) on the surface of the wafer with an insufficient energy to etch the surface of the wafer but with a sufficient energy to create the microscopic roughness on the surface of the wafer (see col. 2 lines 29-42 and col. 3 lines 14-27). Sufficient energy to create the microscopic roughness is present, since a gas environment with argon introduced to the surface of the wafer will generate some level of microscopic roughness.

With respect to Claims 35 and 42, Akiyama discloses the microscopic roughness on the surface of the wafer is provided by disposing the wafer is a chamber (i.e. cooling apparatus) and by passing ions of an inert gas through the chamber (i.e. cooling apparatus) with insufficient energy to etch the surface of the wafer but with sufficient energy to produce the microscopic roughness on the surface of the wafer (see col. 2 lines 20-42 and col. 12 lines 1-9; Figs. 4A and 4B). Furthermore, one skilled in the art at the time of the invention would readily recognized having a minimal amount of an inert gas to pass through the chamber during the deposition to prevent molecules of the inert gas from being entrapped in the chromium layer, since a large quantity of inert gas would not provide a stable chromium layer thus when heating the chromium layer, gas would escape causing atoms from the chromium layer to migrate to next level metal level. Therefore, it would have been obvious to have a minimal amount of an inert gas in the chromium layer of Akiyama, since provide a stable chromium layer and prevent atoms from escaping when gas is release when the chromium layer is heated.

10. Claims 8, 13, 17-19, 24-28, 30, 31-33, 40, 42, and 43, are rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama et al. (U.S. 6,391,796) and the Admitted Prior Art as applied to claims 5, 11, 22, 29, 30, and 39, above, and further in view of Hong (U.S. 6,375,810).

With respect to Claims 8, 13, 17, 24-27, 30, 31, 33, 40, 42, and 65, Akiyama-Admitted Prior Art the claimed invention except wherein the chromium layer is deposited on the surface of the wafer in a magnetron with no RF bias or with a RF bias in the magnetron and with a low flow rate of molecules of an inert gas in the magnetron.

However, Hong discloses a metal layer deposited on the surface of the wafer in a magnetron with no RF or with a RF in the magnetron and with a low flow rate (i.e. rate sufficient to deposit the metal layer) of molecules of an inert gas (i.e. argon) in the magnetron (see col. 1 lines 22-55 and col. 2 lines 1-39). Thus, any metal layer (i.e. chromium) can be deposited by the process of Hong, since any type of metal layer can not be ionized utilizing an environment with no RF bias or with a RF bias in the magnetron yielding a uniform deposition of metal. Akiyama-Admitter Prior Art and Hong have substantially the same environment of a wafer introduced in a chamber with gas. Therefore, one skilled in the art at time of the invention would readily recognize having an environment with no RF in the magnetron with the process of Akiyama-Admitter Prior Art, since this environment would yield a uniform deposition of material that is not ionized on a wafer as taught by Hong.

With respect to Claims 18, 19, 28, the Admitted Prior Art discloses wherein a layer of a metal selected from a group consisting of gold, nickel and copper is deposited on the surface of the nickel vanadium layer and wherein a component or sub-assembly is soldered to the layer of the metal selected from the group consisting of copper, gold and silver (see specification, pages 1, 2 in its entirety, page 7 lines 5-14, and page 8 lines 6-10).

With respect to Claims 32 and 43, Akiyama discloses microscopic roughness on the surface of the wafer is created by providing ions of an inert gas (i.e. argon) on the surface of the wafer with an insufficient energy to etch the surface of the wafer but with a sufficient energy to create the microscopic roughness on the surface of the wafer (see

col. 2 lines 29-42 and col. 3 lines 14-27). Sufficient energy to create the microscopic roughness is present, since a gas environment with argon introduced to the surface of the wafer will generate some level of microscopic roughness.

Allowable Subject Matter

11. Claim 59 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

12. Claims 4, 6, 7, 14-16, 20, 21, 23, 34, 60-64, and 67 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowance subject matter: the prior art of record does not teach or suggest the combination of a wafer disposed on a wafer land and wherein a layer of chromium is deposited on the wafer land after the microscopic roughness has been produced on the surface of the wafer in claim 4.

The combination of a microscopic roughness is produced on the surface of the wafer after the thin layer of the wafer has been removed from the surface of the wafer and wherein the chromium layer is thereafter deposited on the microscopically rough surface of the wafer and wherein a low rate of flow of an inert gas is provided on the

wafer layer when, the-chromium layer is deposited on the surface of the wafer thereby to minimize the presence of the inert gas in the chromium layer in claim 6.

A wafer land is disposed in an abutting relationship with the wafer and wherein a layer of chromium is deposited on the surface of the wafer land before etching the surface of the wafer in claim 7.

Providing a flow of an inert gas in the order of forty (40) to fifty (50) standard cubic centimeters per minute through a chamber containing the wafer to etch a microscopic layer of material with impurities from the surface of the wafer and provide an atomic roughness to-the wafer surface, thereafter providing a flow of an inert gas through the chamber at a flow rate of approximately forty (40) to fifty (50) standard cubic centimeters per minute and a power in the order of six hundred watts (600 W) to twelve hundred watts (1200 W) to clean the surface of the wafer and increase the roughness of the wafer surface, disposing the wafer on a wafer land, and then providing a flow of an inert gas at a rate through the chamber at a low power in the order of fifty watts (50 W) to one hundred watts (100 W) to provide the surface of the wafer with the microscopic roughness in claim 59.

The combination of an inert gas is argon and wherein the wafer disposed on a wafer land and wherein a layer of chromium is deposited on the wafer land after the microscopic roughness has been produced on a the surface of the wafer in claim 67.

A chamber is provided in which to perform the recited steps and wherein molecules of [the] an inert gas flow through the chamber in an order of three (3) to five (5) standard cubic centimeters per minute (3-5 sccm) in claim 14.

The prior art made of record and not relied upon is cited primarily to show the process of the instant invention.

Conclusion

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (703) 306-9143. The fax phone number for this Group is (703) 308-7722 or 7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956

Alonzo Chambliss
Primary Patent Examiner
Art Unit 2827

AC/April 17, 2004